

**THAT WHICH IS CLAIMED IS:**

1. A redirecting feedthrough lens antenna system comprising:

first and second phased array antennas coupled together in back-to-back relation and comprising respective first and second arrays of dipole antenna elements thereon, each dipole antenna element comprising a medial feed portion and a pair of legs extending outwardly therefrom;

a respective phase shifter connected between each pair of back-to-back dipole antenna elements of said first and second dipole antenna arrays; and

a controller for cooperating with said phase shifters to cause a signal received by said first phased array antenna at a first angle to be transmitted from said second phased array antenna at a second redirected angle different from the first angle.

2. The redirecting feedthrough lens antenna system of Claim 1 further comprising a respective gain element also connected between each pair of back-to-back dipole antenna elements of said first and second dipole antenna arrays.

3. The redirecting feedthrough lens antenna system of Claim 2 wherein said controller also controls a gain of said gain elements.

4. The redirecting feedthrough lens antenna system of Claim 2 wherein said phase shifters and gain

elements connected between each pair of back-to-back dipole antenna elements of said first and second dipole antenna arrays are connected in series.

5. The redirecting feedthrough lens antenna system of Claim 1 wherein adjacent legs of adjacent dipole antenna elements include respective spaced apart end portions.

6. The redirecting feedthrough lens antenna system of Claim 5 wherein the spaced apart end portions have predetermined shapes and relative positioning to provide increased capacitive coupling between the adjacent dipole antenna elements.

7. The redirecting feedthrough lens antenna system of Claim 5 further comprising a respective impedance element electrically connected between the spaced apart end portions of adjacent legs of adjacent dipole antenna elements.

8. The redirecting feedthrough lens antenna system of Claim 7 wherein said impedance elements comprise capacitors.

9. The redirecting feedthrough lens antenna system of Claim 7 wherein said impedance elements comprise inductors.

10. The redirecting feedthrough lens antenna system of Claim 1 further comprising a ground plane adjacent said first and second dipole element arrays.

11. A redirecting feedthrough lens antenna system comprising:

first and second phased array antennas coupled together in back-to-back relation and comprising respective first and second arrays of dipole antenna elements thereon, each dipole antenna element comprising a medial feed portion and a pair of legs extending outwardly therefrom;

a ground plane adjacent said first and second dipole element arrays;

a respective phase shifter and a respective gain element connected between each pair of back-to-back dipole antenna elements of said first and second dipole antenna arrays; and

a controller for cooperating with said phase shifters to cause a signal received by said first phased array antenna at a first angle to be transmitted from said second phased array antenna at a redirected second angle different from the first angle, and said controller also controlling a gain of said gain elements.

12. The redirecting feedthrough lens antenna system of Claim 11 wherein said phase shifters and gain elements connected between each pair of back-to-back dipole antenna elements of said first and second dipole antenna arrays are connected in series.

13. The redirecting feedthrough lens antenna system of Claim 11 wherein adjacent legs of adjacent dipole antenna elements include respective spaced apart end portions.

14. The redirecting feedthrough lens antenna system of Claim 13 wherein the spaced apart end portions have predetermined shapes and relative positioning to provide increased capacitive coupling between the adjacent dipole antenna elements.

15. The redirecting feedthrough lens antenna system of Claim 13 further comprising a respective impedance element electrically connected between the spaced apart end portions of adjacent legs of adjacent dipole antenna elements.

16. The redirecting feedthrough lens antenna system of Claim 15 wherein said impedance elements comprise capacitors.

17. The redirecting feedthrough lens antenna system of Claim 15 wherein said impedance elements comprise inductors.

18. A method of using a redirecting feedthrough lens antenna system comprising first and second phased array antennas coupled together in back-to-back relation and comprising respective first and second arrays of dipole antenna elements thereon, each dipole antenna element comprising a medial feed portion and a

pair of legs extending outwardly therefrom, and further comprising a respective phase shifter connected between each pair of back-to-back dipole antenna elements of the first and second dipole antenna arrays, the method comprising:

controlling the phase shifters to cause a signal received by the first phased array antenna at a first angle to be transmitted from the second phased array antenna at a redirected second angle different from the first angle.

19. The method of Claim 18 wherein the redirecting feedthrough lens antenna system further comprises a respective gain element also connected between each pair of back-to-back dipole antenna elements of the first and second dipole antenna arrays; and further comprising controlling a gain of the gain elements.